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such a primitive home. Of burial mounds there were several different kinds.

But comparatively few of the mounds contained valuable relics. In many of the mounds nothing at all of interest was found. It is an error to think that the ancient people always buried with the dead his personal effects.

He had, however, taken from mounds pipes, some of which are very peculiar, many kinds of sea shells, stone, copper and other ornaments, but seldom any weapons. Some of the copper ornaments shown were very curious and ingeniously made; among them were copper turtles, closely resembling the living animals, and large pipes of stone that represented the human figure in various positions. The speaker gave illustrations of mounds in which it would seem that sometimes on the death of their rulers a number of slaves or subjects were buried with him.

Mr. McAdams concludes from his explorations that the burial mounds show at least two distinct classes of people differing from our present Indians.

The mound builders of the low lands of Illinois, like those of Ohio, were characterized by their peculiar pipes with the crescent base, the stem being a part of the base.

The potter makers, such as made the peculiar pottery of the region, were a different people, and imitated nature in their pottery, just as the mound builder did with his pipes. He had specimens on exhibition, and many illustrations showing this peculiar pottery representing men, animals, birds, fishes, shells and other things. The pottery makers' pipes were very unlike the mound builders', and were made for the insertion of a stem, the orifice generally being funnel shaped.

The speaker gave a spirited illustration of the great Temple mound, of Cohokia, opposite the mouth of the Missouri river, and describes it as a place of worship. This mound is 90 feet high. In the vicinity of this great mound were numerous flat square mounds called platforms. These platform mounds are usually ten or twelve feet high, and so large as often to contain on the summit farm-houses, with the out-buildings. In digging cellars, wells, etc., in these mounds, many relics were found; of these Mr. McAdams has a large collection. The speaker closed by describing a hitherto unknown earthwork, circular in form, one mile in circumference at the mouth of the Illinois river. Although the mounds occur in such great numbers and magnitude this seems to be the only earthwork in the region. Mr. McAdams expects to still prosecute his researches in this interesting locality.

DETERMINATION OF THE COMPARATIVE DIMENSIONS OF ULTIMATE MOLECULES; AND DEDUCTION OF THE SPECIFIC PROPERTIES OF SUBSTANCES.

BY PROF. W. N. NORTON.

In this paper a detailed exposition is given of the mechanical constitution of an ultimate molecule, the conditions of dynamical equilibrium are definitely stated, and several formulas investigated, representing its diverse mechanical features. From these definite mathematical expressions are deduced the general mechanical, physical, and chemical properties of substances. These are then employed in a detailed discussion of the properties of special substances. In this discussion the fundamental assumption is made that the atoms of different substances may differ in density, as well as in weight or mass. From this point of view it becomes possible to derive the comparative dimensions, and all the special features of the ultimate molecules of substances, from their molecular volumes and tenacities or co-efficients of elasticity, as experimentally determined. The results of the numerical computations for a large variety of substances, from hydrogen to bismuth, are given in tables, and also represented graphically, and comparisons made with experimental results.

Chemical transformations are attributed to an effective force of electric tension developed by the contact of dissimilar molecules. An electro-motive force thus comes into play, determining an electric movement from one set of molecules to the other, and bringing them into approximate

correspondence. The comparative values of the forces of electric tension, as well as of the electro-motive force, given in the tables, serve to make known the chemical relations of the substances considered. The chemical effects of heat are incidentally considered.

The entire discussion comprised in this and former papers may be epitomized as follows:

1—It has been shown that the mechanical laws and relations of bodies may be deduced from one general molecular formula; and that from their atomic weights, and certain comparative densities assigned to their atoms, may be derived definite expressions representative of the various properties of special substances.

2—We see that the diverse phenomena of Inanimate Nature are but different consequences of variations or inequalities of ethereal tension, produced by ethereal waves; and that, contemplated from the highest point of view, they may be conceived to result from the operation of one primary form of force on one primordial form of matter.

THE publication of the papers read before the recent meeting of this Association will be continued in our next issue, September 18th.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

When a publishing house prints a date at the foot of a title page it is not always a guarantee to the public that the matter of the book has a connection with the date. In a play, a novel, or even a history, the date of a new edition only suggests that some class of readers desires another form of the work. But when the subject of the publication is of such a character as to require additions in the progress of events, it is necessary to enlarge, remodel, or amend the contents, to suit the advance of knowledge and the public need. This is generally announced on the production of a new book. Its advertisement, if not made in the preface, is invariably embodied in a date appended to the title page. In fact, so general has this custom become, that I do not think any one, who takes up a new book of this kind for the first time, would neglect to cast his eye upon the date of publication.

The other day, looking over the well filled shelves of Messrs. Appleton & Co., I picked up a book of this progressive class, to whose pages I have turned with pleasure during many years, for amusement and instruction. Its concise statement of the advances in physical science had always struck me as most complete. I purchased the book (Arnot's Elements of Physics) for old acquaintance sake, and, on reaching my library, looked through its familiar pages for the latest discoveries; but imagine my disgust, to find that the edition of 1880 made no mention of Telephone, Motograph or Phonograph, three applications of science which will make the last decade one of the most brilliant of the century.

This may not be a commercial, but it is surely a scientific fraud.

D. O. FARROW.

WHAT constitutes an artificial mineral water is an important question to the consumer, for obvious reasons, and to the importer it is a serious matter, as commercial rivalry and custom duties have forced its consideration upon them and the authorities. Trouble has been caused in other countries, also, for want of a proper definition, and it has given rise to a German imperial decree in which a solution of the difficulty is attempted. This decree, reads as follows: "Under artificial mineral waters are included not only imitations of certain mineral waters as they occur in nature, but also is understood such other artificially prepared solutions of mineral substances as represent mineral waters, without corresponding in their chemical composition to natural waters."